

Readme file for ODS_Emission.1951-1995.nc & ODS_Emission.1996-2010.nc
Last updated: September 30, 2011.

Substances: CFC-11, CFC-12, HCFC-22, CH3CCl3

The base year geographically resolved emission distribution (unit: kg/m²/s) is stored in variables CFC11_EMISSION, CFC12_EMISSION, HCFC22_EMISSION, CH3CCL3_EMISSION.

The base year used for each ODS are:

- i) 1986 for CFC-11, CFC-12 between 1951-1995; 2000 for CFC-11, CFC-12 between 1996-2010.
- ii) 1990 for HCFC-22, CH3CCl3 between 1951-2010.

To get the emission of an individual year, one needs to multiply the base year emission by the emission scaling factor of that corresponding year. The yearly-based emission scaling factors are stored in variables CFC11_SCALE, CFC12_SCALE, HCFC22_SCALE, CH3CCl3_SCALE. The calculated emission of an individual should equal (or approximately equal) the value listed in Table 1.

The annual global emission data are provided by Archie McCulloch. These are bottom up emissions computed using time series of data on production and sales into various end-use categories having different release functions. References: McCulloch and Midgley (2001), McCulloch *et al.* (2001, 2002).

The geographical resolved distribution is based on the distribution of 1986 for CFC-11 and CFC-12, 1990 for HCFC-22 and CH3CCl3 for 1950-1995. From 1995 to 2010, the distribution is calculated using the geographical resolved fractionation of 2000 for CFC-11 and CFC-12. The calculated global emissions were distributed among countries using the distribution of individual national fractions of the world total Gross Domestic Product. Within each country, emissions were distributed to individual gridsquares using a population distribution. References: <http://www.geiacenter.org/>, McCulloch *et al.* (2001, 2002), AFEAS (2001), Production and Consumption of Ozone Depleting Substances, 1986-2000 (2002).

For questions, please email Qing Liang at Qing.Liang@nasa.gov.

Table 1. Global annual emission in 10³ Kg/year.

Year	CFC-11	CFC-12	HCFC-22	CH3CCl3
1951	7633	32397	549	49
1952	10985	33684	849	98
1953	14955	37877	1206	386
1954	18576	42865	1652	1163
1955	23019	48181	2184	3365
1956	28709	56144	3399	5974
1957	32161	63815	3977	9107
1958	30158	66937	4856	10398
1959	30888	74779	6856	14223
1960	40550	89093	8057	17765
1961	52133	100782	8744	19507
1962	65380	117651	10759	27391

1963	80029	138451	13240	30622
1964	94997	160469	16471	35300
1965	108294	180731	19198	46832
1966	121273	201638	23461	67556
1967	137642	227966	28029	91329
1968	156791	254763	34089	111455
1969	182306	285139	41397	131162
1970	207881	313167	45021	138116
1971	229081	337631	49906	166884
1972	258738	369522	54591	209565
1973	296234	408534	62647	260102
1974	326696	442861	70797	298671
1975	318339	434391	71547	303173
1976	326722	426242	80638	374318
1977	314565	410581	89826	451879
1978	294826	385190	66641	502489
1979	276548	388768	68909	501845
1980	265639	392003	82757	529525
1981	264885	412252	96206	542527
1982	263227	423210	109930	519220
1983	282197	434545	124809	532560
1984	302885	446248	131639	580676
1985	314154	450234	132754	589937
1986	332887	452122	136079	599407
1987	351589	457468	142020	619943
1988	357972	461163	155863	661527
1989	307279	427545	174275	685978
1990	256415	368486	188858	712530
1991	223531	325323	194744	634259
1992	201857	306290	205111	595197
1993	125684	287413	208136	392068
1994	120742	262730	216216	298743
1995	113442	243585	222530	250378
1996	114408	223359	229060	113235
1997	104624	201117	232223	58736
1998	95470	177001	237686	40582
1999	90554	149216	248286	34672
2000	87780	128638	263573	29608
2001	83166	111406	278081	19959
2002	74480	98132	316092	17322
2003	71261	91083	275140	16040

2004	69295	88989	306603	12911
2005	66367	86176	316709	11385
2006	62734	81085	329386	11247
2007	58102	73857	344070	11164
2008	53440	65174	360318	11100
2009	48524	54993	377787	11048
2010	43362	42956	394273	8072
2100	0	0	0	0